Pathogens in Tomales Bay Watershed

Proposed Basin Plan Amendment

Proposed Basin Plan Amendment

The following text is to be inserted in Chapter 4, right after the introduction of a section entitled "Surface Water Protection and Management—Nonpoint Source Control."

Tomales Bay Watershed Pathogens TMDL

The overall goal of the Tomales Bay Watershed Pathogens Total Maximum Daily Load (TMDL) is to minimize human exposure to disease-causing pathogens. The following sections establish a density-based pathogens TMDL for Tomales Bay and its tributaries, and actions and monitoring necessary to implement the TMDL. The TMDL defines allowable density-based water quality bacteria concentrations and prohibits the discharge of human waste. The associated implementation plan specifies the actions necessary to protect and restore beneficial uses. As outlined in the adaptive implementation section, the effectiveness of implementation actions, monitoring to track progress toward targets, and the scientific understanding pertaining to pathogens will be periodically reviewed and the TMDL may be adapted as warranted.

Problem Statement

Monitoring results for Tomales Bay and its main tributaries (Lagunitas, Walker, and Olema creeks) indicate that these waters exceed bacteria water quality objectives for shellfish harvesting and recreational waters and as such, are impaired by pathogens. The presence of pathogens is inferred from high fecal coliform bacteria (a commonly used indicator of human pathogenic organisms) concentrations. Pathogen pollution is adversely affecting existing beneficial uses, which include shellfish harvesting (i.e., sport and commercial oyster, clam, and mussel harvesting), water contact recreation (i.e., swimming, fishing) and non-contact water recreation (i.e., boating, kayaking).

This TMDL addresses the following pathogen-impaired water bodies in the Tomales Bay Watershed:

- Tomales Bay
- Lagunitas Creek
- Walker Creek
- Olema Creek

Sources

If not properly managed, the following Tomales Bay Watershed sources have the potential to discharge pathogens to surface waters: faulty on-site sewage disposal systems (OSDSs), small wastewater treatment facilities and sewage holding ponds, boat discharges, grazing lands, dairies, equestrian facilities, municipal runoff, and wildlife.

Numeric Targets

The numeric water quality targets for the Tomales Bay Watershed Pathogens TMDL (Table 4-20) are based on fecal coliform bacteria concentrations aimed at protecting shellfish consumers and recreational users. These density-based numeric targets define bacterial densities that indicate minimal risk to humans and are based on the water quality objectives contained in Table 3-1. The targets are intended to protect the most sensitive beneficial use, shellfish harvesting. While water quality objectives to protect recreational uses are higher than those for shellfish protection, the more stringent objective applies to tributary waters because tributary discharges to Tomales Bay receive minimal dilution.

In addition, no human waste shall be discharged to Tomales Bay or its tributaries. The no human waste discharge target is consistent with the existing wastewater discharge prohibitions contained in Table 4-1. This target is necessary because human waste is a significant source of pathogenic organisms, including viruses, and attainment of fecal coliform targets alone may not sufficiently protect human health. The coliform bacterial targets in combination with the human waste discharge prohibition are the basis for the TMDL and load allocations and fully protect beneficial uses.

Table 4-20
Coliform Bacteria Targets[c] for Tomales Bay and Its Tributaries
(The targets are expressed as Most Probable Number [MPN] of fecal coliforms per 100 mL of water.)

Waterbody	**Fecal Coliform** (MPN/100 mL)
Tomales Bay	Median < 14 [a] 90th percentile < 43 [b]
Tomales Bay Tributaries	Single-sample maximum: 43

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.
b. No more than 10% of total samples during any 30-day period may exceed this number.
c. These targets are applicable year-round.

Total Maximum Daily Load

Table 4-21 lists the Tomales Bay Watershed Pathogens TMDL. The TMDL is applicable year-round. The TMDL for Tomales Bay is the same as the Bay TMDL target, which is the shellfish harvesting water quality objective. The TMDL also ensures protection of tributary water contact recreational uses, as well as Bay shellfish harvesting, through the tributary TMDL target.

Table 4-21 **Total Maximum Daily Load of Pathogens Indicators for Tomales Bay and its Tributaries**		
Waterbody	**Indicator Parameter**	**TMDL** (Most Probable Number (MPN) of fecal coliforms per 100 mL of water)
Tomales Bay	Fecal coliform	Median < 14 [a] 90th Percentile < 43 [b]
Major Tributaries: Walker Creek Lagunitas Creek Olema Creek	Fecal coliform	Single-Sample Maximum < 43
a. Based on a minimum of no less than five samples equally spaced over a 30-day period. b. No more than 10% of total samples during any 30-day period may exceed this number.		

Load Allocations

Table 4-22 presents density-based load allocations for Tomales Bay Watershed's pathogens source categories.

Table 4-22 **Density-Based Pollutant Load Allocations[d] for Dischargers of Pathogens in Tomales Bay Watershed**			
Categorical Pollutant Source	**Load Allocation** **Fecal Coliform (MPN/100 mL)**		
	For Direct Discharges to the Bay		**For Discharges to Major Tomales Bay Tributaries**
	Median[a]	**Maximum[b]**	**Single-Sample Maximum**
Onsite Sewage Disposal Systems	0	0	0
Small Wastewater Treatment Facilities	0	0	0
Boat Discharges	0	0	N/A
Grazing Lands (Ranchlands and Riparian Pasturelands)	14	43	43
Dairies	14	43	43
Equestrian Facilities	14	43	43
Municipal Runoff	14	43	43
Wildlife[c]	14	43	43
a. Based on a minimum of no less than five samples equally spaced over a 30-day period. b. No more than 10% of total samples during any 30-day period may exceed this number. c. Although wildlife is recognized as a source, it is not believed to be a significant source of pathogens; therefore, no management measures are anticipated for this source. d. These allocations are applicable year-round.			

When all dischargers (i.e., individual facilities, property owners, etc.) associated with each source category meet the density-based allocation, the TMDL allocations will be achieved. Alternatively, when tributary waters meet the density-based allocation, the TMDL allocations will be achieved.

Pathogens TMDL Implementation Plan

The Tomales Bay Watershed Pathogens TMDL Implementation Plan builds upon previous and ongoing successful efforts to reduce pathogen loads in Tomales Bay and its tributaries. The plan requires actions consistent with the California Water Code (CWC 13000 et seq.), the state's Nonpoint Source Pollution Control Program Plan (CWC Section 13369) and the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program.[1]

This plan specifies required implementation measures (Table 4-23) for each of the source categories (Table 4-22). These implementation measures include evaluation of operating practices, development of comprehensive site-specific pathogens control plans, implementation of site-specific management measures, and submittal of progress reports documenting actions undertaken. Progress reports may be submitted directly to the Water Board or, if designated, through third parties. These progress reports will serve as documentation that source reduction measures are being implemented. While third parties may provide valuable assistance to TMDL implementation, the discharger is the entity responsible for complying with the specified regulations and regulatory controls. Responsible parties within each source category are required to implement the measures identified in Table 4-23 by January 2009.

The state's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program requires that current and proposed nonpoint source discharges are regulated under waste discharge requirements (WDRs), waiver of waste discharge requirements, Basin Plan prohibition, or some combination of these tools. Table 4-24 describes the method that will be used to regulate dischargers in each source category of the pathogens.

[1] State Water Resources Control Board. 2004. *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Prevention Control Program*.

Table 4-23
Trackable Implementation Measures for the Tomales Bay Watershed Pathogens Total Maximum Daily Load [1]

Source Category	Action	Implementing Party
On-Site Sewage Disposal Systems (OSDSs)	Establish a watershed-wide management program that documents and assess performance of OSDSs.	Marin County, Community Development Agency
	Develop management plan for meeting repair standards for all OSDSs that fail to pass inspection.	Marin County, Community Development Agency
	Report progress on implementation of OSDS assessment and repair program.	Marin County, Community Development Agency
Small Wastewater Treatment Facilities	Comply with Waste Discharge requirements (WDRs).	Small wastewater treatment facilities
	Inspect and evaluate all permitted WDR facilities and update WDRs as warranted.	Water Board staff
	Report progress on inspection and evaluation of WDR facilities.	Water Board staff
Boat Discharges	Evaluate the adequacy of on-shore restroom facilities and boater disposal/pump out facilities and develop and implement a plan to ensure adequate facilities are provided in Tomales Bay.	Point Reyes National Seashore, California Coastal Commission, California State Lands Commission, California State Parks, County of Marin, Regional Water Board, Gulf of the Farallones National Marine Sanctuary
	Develop and implement a boating management plan for Tomales Bay that includes: recommendations for mooring exclusion zones; permitting procedures for mooring; and enforcement procedures to ensure compliance with mooring exclusion areas and no sewage discharge from boats.	Point Reyes National Seashore, California Coastal Commission, California State Lands Commission, California State Parks, County of Marin, Regional Water Board, Gulf of the Farallones National Marine Sanctuary
	Report progress on implementing waste facilities and boating management plan.	Point Reyes National Seashore, California Coastal Commission, California State Lands Commission, California State Parks, County of Marin, Regional Water Board, Gulf of the Farallones National Marine Sanctuary

Table 4-23, continued		
Source	**Action**	**Implementing Party**
Grazing Lands (Ranchland and Riparian Pastureland)	Identify necessary site-specific grazing management measures that will reduce pathogens runoff.	Dairies and ranchers (landowners and leasees)
	Comply with state's Nonpoint Source Guidelines for rangelands.	Dairies and ranchers (landowners and leasees)
	Implement grazing management measures that reduce pathogens runoff.	Dairies and ranchers (landowners and leasees)
	Report progress on implementation of grazing management measures that reduce pathogens runoff.	Dairies and ranchers (landowners and leasees)
Dairies	Comply with animal waste guidelines and dairy waiver provisions.	Dairies (landowners and leasees)
Equestrian Facilities	Complete watershed-wide assessment of equestrian facilities and identify management measures necessary to reduce pathogens runoff.	Equestrian facilities, Marin County, and Marin County Stormwater Pollution Prevention Program
	Implement management measures that reduce pathogens runoff.	Equestrian facilities, Marin County, and Marin County Stormwater Pollution Prevention Program
Municipal Runoff	Report progress on implementation of management measures to reduce pathogens runoff.	Equestrian facilities, Marin County, and Marin County Stormwater Pollution Prevention Program
	Implement stormwater management plan.	Marin County, Stormwater Pollution Prevention Program
	Update/amend stormwater management plan to include specific measures to reduce pathogen loading for Tomales Bay watershed.	Marin County, Stormwater Pollution Prevention Program
	Report progress on implementation of pathogens reduction measures.	Marin County, Stormwater Pollution Prevention Program

[1] All actions to be implemented by January 2009.

Table 4-24 **Regulatory Framework for Discharges by Source Category**	
Source Category	**Regulatory Tool**
On-site Sewage Disposal Systems (OSDS)	Waiver[1] of Waste Discharge Requirements
Small Wastewater Treatment Facilities	Individual facility Waste Discharge Requirements
Boat Discharge	Prohibition of Human Waste Discharge applies to all boaters in Tomales Bay
Grazing Lands (Ranchlands and Riparian Pasture Lands)	Waiver[1] of Waste Discharge Requirements
Dairies	Waiver[1] of Waste Discharge Requirements or Individual WDRs, as appropriate
Equestrian Facilities	Waiver[1] of Waste Discharge Requirements
Municipal Storm Water	General NPDES Permit
[1]Water Board retains the option of requiring individual waste discharge requirements or compliance with a discharge prohibition, as appropriate.	

Evaluation and Monitoring

Dischargers, stakeholders, and Water Board staff will conduct water quality monitoring to evaluate fecal coliform concentration trends in Tomales Bay and its tributaries. Five years after TMDL adoption, the Water Board will evaluate monitoring results and assess progress made toward attaining TMDL targets (Table 4-20) and load allocations (Table 4-22).

In 2009 and approximately every five years after the adoption of the TMDL, the Water Board will evaluate compliance with the trackable implementation measures specified in Table 4-23. In evaluating compliance with the trackable implementation measures, the Water Board will consider the level of participation of each source category as well as individual dischargers (as documented by Water Board staff or designated third parties).

Approximately every five years the Water Board will determine if reasonable implementation progress has been made and if additional regulatory or enforcement actions are necessary. If source control actions are fully implemented throughout the Watershed and the TMDL targets are not met, the Water Board may consider re-evaluating or revising the TMDL and allocations. If, on the other hand, the required actions are not fully implemented, or are partially implemented, the Water Board may consider regulatory or enforcement action against parties or individual dischargers not in compliance.

Adaptive Implementation

Approximately every five years, the Water Board will review the Tomales Bay Watershed Pathogens TMDL and evaluate new and relevant information from monitoring, special studies, and scientific literature. The reviews will be coordinated through the Water Board's continuing planning program and will provide opportunities

for stakeholder participation. Any necessary modifications to the targets, allocations, or implementation plan will be incorporated into the Basin Plan. In evaluating necessary modifications, the Water Board will favor actions that reduce sediment and nutrient loads, pollutants for which the Tomales Bay Watershed is also impaired. At a minimum, the following questions will be used to conduct the reviews. Additional questions will be developed in collaboration with stakeholders during each review.

1. Are the Bay and the tributaries progressing toward TMDL targets as expected? If progress is unclear, how should monitoring efforts be modified to detect trends? If there has not been adequate progress, how might the implementation actions or allocations be modified?
2. What are the pollutant loads for the various source categories (including naturally occurring background pathogen contributions), how have these loads changed over time, and how might source control measures be modified to improve load reduction?
3. Is there new, reliable, and widely accepted scientific information that suggests modifications to targets, allocations, or implementation actions? If so, how should the TMDL be modified?
4. The targets and allocations do not take into account bacterial die-off and are therefore conservative (more protective). If bacterial die-off between discharge points and the Bay is found to be significant, higher allocations may be considered. What are bacterial die-off rates? Do they vary by season? What are bacteria transport times from sources to the Bay?
5. The tributary target, allocations, and TMDL assume that minimal dilution of tributary waters takes place between discharge points and Tomales Bay shellfish harvesting areas and are therefore conservative (more protective). If modeling and/or water quality studies suggest that the Bay can attain targets with higher pathogen concentrations in tributary waters, the TMDL may be revised accordingly. How does estuarine mixing and dilution of tributary waters vary by flow and season?

The following table will be added to the section at the end of Chapter 4 entitled "Continuing Planning," right after the table for the San Francisco Bay Mercury TMDL.

Regional Board Resource Allocation

The items below have been identified in this review as specific areas for which Water Board planning resources should be allocated. The items are divided into categories and each item is followed by an estimate of the frequency at which the item will be reviewed. Resolution of these items may result in future Basin Plan amendments.

Total Maximum Daily Load	**Frequency**
Review the Tomales Bay Watershed Pathogens TMDL and evaluate new and relevant information from monitoring and scientific literature. Determine if modifications to the targets, allocations, or Implementation Plan are necessary.	Every five years